

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

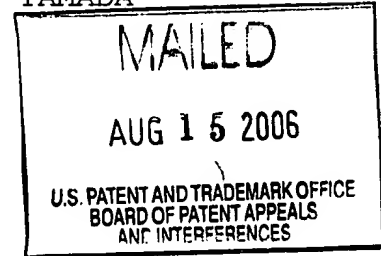
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KEICHIRO WAKAMIYA, SATOSHI YAMADA

Appeal No. 2006-1851
Application No. 09/818,906

ON BRIEF



Before HAIRSTON, RUGGIERO, and BARRY, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This appeal is from the final rejection of claims 7-13. Claims 1-6, which are all of the other claims in the application, were allowed in the Examiner's Answer.

The claimed invention relates to a semiconductor device including a chip, a coating layer, and a plurality of connecting conductors which penetrate the coating layer beyond the outside surface of the coating layer. The connecting conductors include a plurality of different material layers, one of which is a stress-absorbing layer of relatively low hardness.

Representative claim 7 is reproduced as follows:

7. A semiconductor device comprising:
a semiconductor chip,

a protective insulating layer comprising a coating layer covering the surface of the semiconductor chip;

a plurality of connecting conductors connected to the surface of the semiconductor chip and penetrating the coating layer beyond the outside surface of the coating layer, wherein the connecting conductors are connected to bumps as external terminals beyond the outside surface of the coating layer, and wherein the connecting conductors do not include wiring layers and the bumps;

wherein the connecting conductor includes a plurality of layers formed of different material and at least one of the layers is formed as a stress-absorbing layer having lower hardness than other layer.

The Examiner relies on the following prior art:

Akagawa	5,886,415	Mar. 23, 1999
Ohtsuka et. al. (Ohtsuka)	5,952,718	Sep. 14, 1999
Yamaji et. al. (Yamaji)	6,159,837	Dec. 12, 2000
		(filed Jul. 15, 1999)
Chakravorty	6,181,569	Jan. 30, 2001
		(filed Jun. 07, 1999)
Khoury	6,436,802	Aug. 20, 2002
		(filed Oct. 14, 2000)

Claims 7 and 8 stand rejected under 35 U.S.C. §103(a) as obvious over Yamaji in view of Ohtsuka and Chakravorty. Claims 9 and 10 stand rejected under 35 U.S.C. §103(a) as obvious over Yamaji, Ohtsuka, and Chakravorty, and further in view of Akagawa. Claims 11 through 13 stand rejected under 35 U.S.C. § 103(a) as obvious over Yamaji, Ohtsuka, and Chakravorty, and further in view of Khoury.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Briefs¹ and Answer for the respective details.

¹ The Appeal Brief was filed June 22, 2004. In response to the Examiner's Answer mailed September 10, 2004, a Reply Brief was filed October 28, 2004, which was acknowledged and entered by the Examiner as indicated in the communication dated February 14, 2006.

OPINION

We affirm the aforementioned rejections.

Appellants indicate that the claims stand or fall in two groups: (1) claims 1-6; and (2) claims 7-13 (Brief, page 4). Consistent with this indication, Appellants' arguments in the Briefs are directed solely to features present in independent claim 7. The failure of Appellants to separately argue claims which Appellants have grouped together constitutes a waiver of any argument that the Board must consider the patentability of any grouped claim separately. See In re McDaniel, 293 F.3d 1379, 1384, 63 USPQ2d 1462, 1465-66 (Fed. Cir. 2002). Because claims 1-6 are allowed in the Examiner's Answer, we must only address claim 7, which is the sole remaining independent claim, and dependent claims 8-13 will stand or fall with claim 7.

As a general proposition in an appeal involving a rejection under 35 U.S.C. § 103, an Examiner is under a burden to make out a prima facie case of obviousness. If that burden is met, the burden of going forward then shifts to Appellants to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

With respect to the Examiner's 35 U.S.C. § 103(a) rejection of independent claim 7 based on the combination of Yamaji, Chakravorty, and Ohtsuka, after reviewing the Examiner's analysis (Answer, pages 4-6), it is our opinion that the stated position is sufficiently reasonable that we find that the Examiner has at least satisfied the burden of presenting a prima facie case of obviousness. The burden is, therefore, upon Appellants to come forward with evidence and/or arguments which persuasively rebut the Examiner's prima facie case. Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed waived [see 37 CFR § 41.37(c)(1)(vii)].

With respect to representative independent claim 7, Appellants' arguments in response to the Examiner's 35 U.S.C. § 103(a) rejection assert a failure to establish a prima facie case of obviousness since all of the claimed limitations are not taught or suggested by the applied prior art references. After careful review of the disclosures of Yamaji, Chakravorty, and Ohtsuka, in light of the arguments of record, we are in general agreement with the Examiner's position as stated in the Answer. We find no persuasive arguments from Appellants that convince us of any error in the Examiner's assertion of obviousness based on the combination of Yamaji, Chakravorty, and Ohtsuka for the reasons articulated by the Examiner at pages 4-6 and 9-11 of the Answer.

Initially, we find that the teachings of Chakravorty, relied upon by the Examiner as disclosing connecting conductors to an external bump being formed of different material, are cumulative to those of Ohtsuka which provides for connecting conductors 35, 36, and 38 made of different material. Further, Appellants' arguments (Brief, pages 11 and 12; Reply Brief, pages 6-8) to the contrary notwithstanding which allege that the references "teach away" from each other, we agree with the Examiner's finding that ample motivation exists for combining the teachings of Ohtsuka with Yamaji. It is apparent to us that both Ohtsuka and Yamaji are concerned with solving problems related to stress caused by the use of materials with different coefficients of expansion in the area surrounding bump connections (e.g., Yamaji, column 1, lines 40-49 and column 3, lines 32-49). In our view, the teachings of Ohtsuka (e.g., column 5, lines 43-48), which disclose the use of connecting conductors formed of materials with differing hardness to absorb stress, would serve as an obvious enhancement to the device of Yamaji.

Further, to whatever extent Appellants are correct in their assertion that, in contrast to the claimed invention, the connecting layers in Ohtsuka are entirely within the protection layer 34, it is apparent to us from the Examiner's stated position that the Examiner is not suggesting the bodily incorporation of the device of Ohtsuka into the device of Yamaji. Rather, it is Ohtsuka's teaching of using conductors formed of different materials with differing hardness characteristics that

is relied on as a rationale for the proposed combination. As pointed out by the Examiner (Answer, page 10), the disclosure of Yamaji provides a teaching of providing connecting conductors which penetrate the outside surface of a coating layer. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference....Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." See also In re Sneed, 710 F.2d 1544, 1550, 218 USPQ 385, 389 (Fed. Cir. 1983) and In re Nievelt, 482 F.2d 965, 967, 179 USPQ 224, 226 (CCPA 1973).

In view of the above discussion, since the Examiner's prima facie case of obviousness has not been overcome by any convincing arguments from Appellants, and since the Chakravorty is not needed for a proper rejection under U.S.C. § 103(a), we sustain the Examiner's 35 U.S.C. § 103(a) rejection of representative claim 7, as well as dependent claims 8-13 which fall with claim 7, based on the combination of Yamaji and Ohtsuka alone.²

We also make the observation, from our own independent review of the disclosure of Yamaji, that the Yamaji reference teaches each and every one of the limitations of representative independent claim 7. Specifically, Yamaji teaches a semiconductor device (Figure 3) including a semiconductor chip

² The Board may rely on less than all of the references applied by the Examiner in an obviousness rationale without designating it as a new ground of rejection. In re Bush, 296 F.2d 491, 496, 131 USPQ 263, 266-67 (CCPA 1961); In re Boyer, 363 F.2d 455, 458, n.2, 150 USPQ 441, 444, n.2 (CCPA 1966).

(1), a protective insulating layer (3,5) including a coating layer (3) covering the surface of the semiconductor chip, and a plurality of connecting conductors (4a,7) connected to the surface of the semiconductor chip and penetrating the coating layer (see gaps in coating layer 3 above electrode pads 2) beyond the outside surface of the coating layer. Further, Yamaji discloses that the connecting conductors are connected to bumps (8) as external terminals beyond the outside surface of the coating layer, and that the connecting conductors do not include wiring layers and the bumps (column 7 lines 22-23 and 37-39). Further provided in Yamaji is a disclosure that the connecting conductors include a plurality of layers (4a,7) formed of different material (column 5 lines 50-56; column 6 lines 3-7) and at least one of the layers is formed as a stress-absorbing layer having lower hardness than other layer.

Appellants argue that "connecting conductor 4a of Yamaji et. al. does not, however, correspond to a connecting conductor of the claimed invention, because it is a wiring layer which is specifically precluded from being a connecting conductor by express language in claim 1" (Brief, page 6). However, barrier layer (4a) is distinct from a wiring layer as it functions as an insulator intended to prevent diffusion of metallic atoms among layers of a connecting conductor. Appellants point to column 5 of Yamaji, lines 55-56, for the teaching that barrier metal layer 4 constitutes a lead pattern (Brief, page 6). However, this citation is relevant to the first embodiment of the invention,

not the second embodiment as illustrated in Figure 3. In the second embodiment of Yamaji, a layer of barrier metal 4a is formed, and a lead pattern is not formed (column 7, lines 22-23). Therefore, the connecting conductors of Figure 3 do not include wiring layers.

With respect to the limitation that the connecting conductors penetrate the coating layer, Figure 3 of Yamaji shows that the connecting conductors contact electrode pads (2) thereby penetrating both coating and insulating layers 3 and 5.

With respect to the limitation that one of the layers of the connecting conductors is formed as a stress-absorbing layer having lower hardness than the other layer, we note that all solid materials are necessarily stress-absorbing. That is, they are capable of withstanding at least some applied force without yielding. Moreover, because layers 4a and 7 are formed of different materials (column 5 lines 50-56; column 6 lines 3-7), one layer necessarily has lower hardness than the other layer.

In view of the above discussion and analysis of the disclosure of the Yamaji reference, it is our opinion that, although we found no error in the Examiner's proposed combination of the secondary references to Chakravorty and Ohtsuka with Yamaji as discussed supra, the secondary references are not necessary for a proper rejection of representative independent claim 7 since all of the claimed elements are in fact present in the disclosure of Yamaji. A disclosure that anticipates under 35 U.S.C. § 102 also renders the claim unpatentable under 35 U.S.C. § 103, for "anticipation is the epitome of obviousness." Jones

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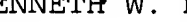
v. Hardy, 727 F.2d 1524, 1529, 220 USPQ 1021, 1025 (Fed. Cir. 1984). See also In re Fracalossi, 681 F.2d 792, 794, 215 USPQ 569, 571 (CCPA 1982); In re Pearson, 494 F.2d 1399, 1402, 181 USPQ 641, 644 (CCPA 1974).

In summary, we have sustained the Examiner's 35 U.S.C. § 103(a) rejection of all of the claims on appeal. Therefore, the decision of the Examiner rejecting claims 7-13 is affirmed.


No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (effective September 13, 2004).

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AFFIRMED


KENNETH W. HAIRSTON
Administrative Patent Judge

Joseph F. Ruggiero
JOSEPH F. RUGGIERO
Administrative Patent Judge


LANCE LEONARD BARRY
Administrative Patent Judge

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